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Gender economic inclusion, governance institutions and economic complexity in Africa

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Abstract

This study examines the effects of gender economic inclusion on economic complexity in Africa, as well as the moderating role of governance institutions on the relationship between gender inclusion and economic complexity. The analysis was based on the pooled OLS and the system generalized method of moments (GMM) estimation techniques, with data from 34 African economies between 2010-2021. The analysis uncovered several important findings. First, from the most robust model (i.e., GMM), positive synergies are apparent because gender economic inclusion promotes economic complexity, and governance dynamics further enhance the positive effect of gender economic inclusion on economic complexity. Second, regardless of the adopted technique, a predominantly positive and statistically significant relationship was identified between gender economic inclusion and economic complexity. Third, it was observed that while governance institutions exhibit a negative relationship with economic complexity, they play a positive role in moderating the relationship between gender inclusion and economic complexity. Fourth, factors such as foreign direct investment inflow, trade openness, and international tourism were identified as potent drivers of economic complexity in Africa, while the impact of human capital appears to be relatively subdued. Consequently, the study emphasizes the need for institutional reforms to improve governance transparency, accountability, and efficiency, alongside advocating for gender-inclusive policies and increased investment in education.

Keywords: Gender economic inclusion; economic complexity; governance institutions; panel data; Africa
JEL Classification: G20; I10; I32; O40; O55

1 Introduction

The intricate relationship between gender dynamics and economic complexity[1] presents a compelling sphere for exploration and analysis, amid the recent trajectory of globalization. Evidently, the global economies have become more integrated through improved trade relations, international capital flows, and technological advancements (World Bank, 2023). However, while substantial socioeconomic advancements have been achieved in recent decades, progress toward reaching gender equality has stagnated, making gender inequality a prominent concern in contemporary Africa. For instance, many developing societies still exhibit a common characteristic in which women are subjected to patriarchal dominance and their roles and responsibilities within the family and community are stereotypically defined. It is noteworthy that social norms and legal frameworks (Agarwal & Bina, 1994; Sen, 1983), women's education (Samarakoon & Parinduri, 2015), and individual capabilities (Agarwal, 1997) have been identified as determinants that contribute to the constrained involvement of women in productive endeavors, which in turn has cost the global economy approximately 160 trillion United States Dollars (USD) (World Bank, 2019). Interestingly, Abney and Laya (2018), noted that involving women in the formal economy has the potential to substantially augment global gross domestic product (GDP) by 2025. This is broadly consistent with Ifelunini et al. (2022) on involving more women in the economic sector to achieve higher levels of economic growth.

The concept of economic complexity has remained a focal point of recent scholarly discourse, due to its association with economic expansion and developmental processes. Interestingly, while Hidalgo and Hausmann (2009) initially explained economic complexity in terms of diversity and ubiquity[2], more contemporary studies have expanded upon this understanding by defining economic complexity as the progression from low-complexity to high-complexity activities with associated benefits such as decreased income disparity (Hartmann et al., 2017), enhance economic specialization (Balland et al., 2022), increased productivity (Fritz & Manduca, 2021), lower output volatility (Soyyiğit, Bayrakdar, & Kiliç, 2023)[3] and infrastructure development (Emeka et al,. 2024). To this end, policymakers and governments in diverse economies and regions have evolved policies aimed at augmenting their respective complexity performance. However, despite abundant natural resources and a significant labor force, African economies still lag behind global peers in terms of global complexity (Canh, Schinckus, and Thanh, 2020; Tabash, Mesagan, and Farooq, 2022). This assertion is further depicted in Table 1 in the Appendices. However, there exist a lack of comprehensive empirical evidence concerning the determinants of economic complexity, particularly in Africa. Thus, an important inquiry arises: What factors can promote Africa's economic complexity? Therefore, as a pioneering effort, our study delves into the examination of

[1] Economic complexity is a holistic measure of a country's or region's ability to produce a diverse range of goods and services, especially those that require advanced knowledge and technology (Observatory of Economic Complexity, 2022).

[2] Diversity refers to the relative share of a country's exports in various foreign markets, while ubiquity quantifies the extent to which these exports are received by different countries.

[3]Adam et al. (2021) posit that as economies become more complex, creating sophisticated products, they also undergo processes of creative destruction that encompass the generation of new employment opportunities and the obsolescence of existing ones.

the relationship between gender economic inclusion[4] and economic complexity, with keen focus on the moderating role of governance institutions.

In this study, the influence of gender economic inclusion on economic complexity is analyzed from two perspectives, namely, female labor force participation (FLFP) and female employment (FEMP). Regarding female labor force participation, a dominant feature of the extant literature is that gender inequality in labor participation is prevalent in Africa (Idowu, & Owoeye, 2019; Anwar, 2022; Enaifoghe, & Maseko, 2023; Ibourk, A., & Elouaourti, 2023). The 2020 report of the International Labor Organisation (ILO) revealed that females account for only 25% of the total workforce in Africa. This implies that for every four individuals participating in the labor force, three are male and only one is female (Baliamoune, 2021). Similarly, Thaddeus et al. (2022) found that as female labor force participation declines in Africa, the agricultural sector gradually replaces the industrial sector, which in turn translates to low complexity for the region. This aligns with the submission of Soyyiğit, Bayrakdar, and Kiliç (2023), who noted that transitioning from the manufacturing sector to the agricultural sector is linked to the production and export of lower-quality goods and services. Hence, as countries focus on producing more complex goods and services, the demand for a highly skilled workforce rises, while the demand for a low-skilled labor force increases in developing economies (Lee & Vu, 2020). Nonetheless, the significance of women's engagement in the labor force is of utmost importance for a nation's socioeconomic progress, particularly in Africa, where women make up over 50% of the population (United Nations Procurement Division, UNPD, 2020). Increasing female labor force participation will empower women, unlock human potential, and boost economic complexity in the region.

Similarly, employment structure matters for economic complexity (Gabrielczak & Kuziemska-Pawlak, 2021; Barza et al., 2020). Presently, achieving gender equality in employment stands as one of the foremost development hurdles confronting countries worldwide, including those within the African continent. In Africa, the employment-to-population ratio for males was roughly estimated at 67.2 percent, whereas for females, it was notably lower at 35.2 percent (World Bank, 2021). Furthermore, the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2023), noted that women in Africa exhibit a lower likelihood of engagement in formal employment when compared to their male counterparts. Furthermore, even when women are employed, they frequently do not fully utilize their capabilities, with part-time employment being a more prevalent reality for women in comparison to men. Hence, efforts to promote gender equality in the workforce are essential for harnessing the full potential of Africa's female workforce and driving sustainable economic growth. Increased female employment results in the enhancement of civic skills, increased political awareness, and expanded access to social networks (Robinson & Gottlieb, 2021; Aalen et al., 2023).

Within the context of this study, we investigate the moderating role of governance institutions in the relationship between gender inclusion and economic complexity. This study contributes significantly to the existing body of knowledge regarding the dynamic interaction between gender inclusion and economic complexity. Unlike previous studies that have often overlooked governance institutions as a mechanism for explaining how gender inclusion can enhance economic performance (Qutb, 2017; Mujahid & Zafar, 2012; Nazmi & Jamal, 2018; Lapatinas et al., 2021; Pertiwi et al., 2021; Soyyiğit, Bayrakdar, & Kiliç, 2023), our study comprehensively

[4] The term “gender economic inclusion” in this study denote enhancement of female economic participation.

analyzes the impact of governance institutions and their moderating influence on the nexus between gender inclusion and economic complexity. As highlighted by Vu (2022), robust institutions are crucial for driving economic growth through human capital development and productive capacity building. This suggests that improving gender inclusion in Africa hinges on strong governance institutions. Therefore, the enhancement of Africa's economic complexity requires the active engagement and participation of governance institutions[5], recognizing that no economy operates in isolation. Figure 1 shows a positive connection between economic complexity and various components of governance institutions.

In light of the aforementioned context, this study aims to assess the impact of gender economic inclusion on economic complexity on the African continent. To achieve these objectives, we employed both the ordinary least squares (OLS) estimator and the dynamic panel system generalized method of moments (system GMM) modelling framework. The choice of System GMM as a robust check on the pooled OLS allowed us to address potential endogeneity concerns that typically arise when using the ordinary least squares (OLS) estimator. The study utilized data spanning from 2010 to 2021, encompassing 34 African countries. The selection of these countries and the chosen timeframe were primarily based on data availability, particularly with regard to economic complexity, which serves as the dependent variable in this analysis. Consequently, this study assesses two null hypotheses as follows:

Hypothesis 1: Gender economic inclusion does not exert an influence on economic complexity in Africa

Hypothesis 2: Governance institutions do not moderate the impact of gender economic inclusion on economic complexity in Africa.

The following sections of this paper are structured as follows: Section 2 provides a thorough review of existing literature and its theoretical foundations. Section 3 delineates the methodology and details the data used. Section 4 presents an analysis of empirical results, while Section 5 concludes with policy recommendations and suggestions for future research.

2. A brief literature review and theoretical underpinnings

2.1 Literature review

Sarwar and Abbasi (2013) note that political, economic, and cultural factors drive gender discrimination, impacting female labor force participation and economic performance in Pakistan. Huruta et al. (2019) find that the imbalanced representation of women in the formal workforce leads to increased participation in the informal sector. The underlying systematic gender discrimination as noted by International Labor Organisation (2016), remains a prominent factor hindering many economies from realizing equitable economic prosperity. Asongu and le-Roux (2019), Tchamyou (2019), and Tchamyou, Erreygers, and Cassimon (2019) found that gender inequality hindered African nations from reaching extreme poverty targets under the Millennium Development Goals. In Indonesia, Nazmi and Jamal (2018) and Pertiwi et al. (2021) discovered a

[5] To ensure that policies are targeted at specific governance institution, we employed a disaggregated pattern of the governance indicators in separate estimations of our model. We also, compute an aggregate governance index through principal component analysis (PCA) for the governance indicators.

negative link between gender inequality and economic growth. Behrman (2017) and Valera et al. (2018) emphasize the importance of providing women with equal opportunities, a sentiment echoed by Awan and Yaqoob (2019) and Altuzarra et al. (2021), who highlight the adverse impact of gender gaps in education and labor participation on economic growth across regions and economies.

In the context of gender dynamics and employment opportunities, Barza et al. (2020) found a positive correlation between economic complexity and female employment, while Saure and Zoabi (2009) suggested a negative association between economic complexity and women's labor force participation. Similarly, Luci (2009) and Lapatinas et al. (2021) identified a U-shaped relationship between employment and economic complexity regarding gender dynamics. Maurya (2023) highlighted how women's involvement in advanced sectors contributes to economic complexity, aligning with Qutb (2017) who utilized the autoregressive distributed lag (ARDL) approach to validate that the quality of education enhances labor productivity in Egypt. In Malaysia and Southeast Asia, Akhtar et al. (2023) and Sulaiman, Muhamad, and Tang (2023) confirmed that increased female labor force participation, higher female education levels, and improved gender parity index foster economic growth. Rao (2017), Bokana and Akinola (2017), Igbanugo, and Dimnwobi (2020), and Ruiters and Charteris (2020) emphasized the positive effects of state policies promoting education on female labor productivity growth. Beton (2023) underscored education's pivotal role in enhancing female labor force participation in Turkey.

From the literature review, several observations emerge. Firstly, there is a noticeable underutilization of the intricate relationship between gender inclusion and economic complexity in Africa. Secondly, existing literature lacks insights into how governance institutions might act as moderating factors in the connection between gender inclusion and economic complexity. Thirdly, although existing literature suggests that gender inclusion can contribute to economic growth, it's crucial to distinguish economic complexity, the focus of this study, from economic growth. Economic complexity pertains to the diversity and sophistication of a nation's or region's productive capacities, while economic growth relates to the tangible expansion of output over time. While factors influencing economic growth, such as human development and gender inclusion, may also affect economic complexity, empirical evidence supporting them as significant drivers of economic complexity in Africa is lacking. Hence, this study aims to fill this gap in the literature by examining the impact of gender economic inclusion on economic complexity in Africa, considering the influence of governance moderators.

2.2 Theoretical underpinnings

Two theoretical frameworks underpin this study. First, Schumpeter's creative destruction theory and the new growth theory. Schumpeter's theory of creative destruction posits that innovation and technological advancement continuously disrupt and transform the economy, leading to the replacement of old industries with new ones, thereby driving economic growth and progress. This theory has been proven right because developing nations have, in the last two decades, experienced heightened demands for new and intricate products that have brought about a transformative shift in various industries and sectors. This transformative shift has in turn translated to the obsolescence of traditional employment roles while simultaneously fostering the emergence of innovative modes of work, as noted by Feldman (2013). However, applying Schumpeter's creative destruction theory

in the context of this study suggests that diverse participation, enhancement, and innovation by women can foster economic growth, disrupt traditional norms, and lead to more inclusive, complex economies, while addressing gender-related barriers is essential for realizing this potential.

As elucidated by Gabrielczak and Kuziemska-Pawlak (2021), a deficient endowment of human capital leads to an unadaptable labor force that remains unresponsive to the labor market's demands. Consequently, the heightened demand for highly skilled labor exacerbates unemployment, particularly affecting women, who bear the brunt of multifaceted inequalities. At this point, the importance of the new growth theory, which departs from traditional neoclassical growth theory by emphasizing the importance of knowledge, innovation, and human capital in driving economic growth, has implications for the gender-economic inclusion-economic complexity relationship. In relation to this study, the enhancement of economic complexity by fostering diverse, innovation-driven industries and the promotion of women's economic participation through education and skills development and engagement in knowledge-based sectors contributes to more inclusive economic growth.

3 Data and methodology

3.1 The data

The present study examines the effect of gender economic inclusion on economic complexity and the moderating role of governance institutions on the gender inclusion-economic complexity relationship of 34[6] African economies between 2010-2021. Within this scope, economic Complexity Index (ECI)[7] serves as the dependent variable, indicative of an economy's capacity for producing sophisticated goods, in contrast to raw materials and basic products. The study considers gender inclusion[8] with two main independent variables, namely: female employment (measured as employment to population ratio, 15+, % female) and female labor force participation (measured as % of female population ages 15+). The other variables included in the study are: trade openness (measured as % of GDP), foreign direct investment (measured as % GDP), international tourism arrival (measured as % of total arrival), human capital development (measured as a geometric mean of normalized indices for health quality, being knowledgeable and decent standard of living) and institutional quality (a composite measure obtained from principal component analysis in order to account for the six World Governance Indicators at the same time). The data for these variables was extracted from the 2023 Massachusetts Institute of Technology's Observatory of Economic Complexity (2023), the World Bank (2023a, 2023b), and the United Nations Development Programme Index (UNDP, 2023). Several empirical studies, such as Asongu and Odhiambo (2020b), Ogbuabor et al. (2023), and Ekeocha, Ogbuabor, and Orji (2021), provide support for the

[6] The countries are: Algeria, Angola, Botswana, Burkina Faso, Cameroon, Chad, Congo Dem. Rep, Congo Republic, Cote d'Ivoire, Egypt, Ethiopia, Gabon, Ghana, Guinea, Kenya, Libya, Madagascar, Mali, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Lone, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia, and Zimbabwe. **Note:** the countries included in the list are those for which economic complexity data spanning from 2010 to 2021 is available in the Observatory of Economic Complexity (OEC) database.

[7] The ECI index, as detailed by Nguea et al. (2022), is calculated based on data linking economies to their export of sophisticated products. It highlights the importance of trade, knowledge, institutions, and technology as crucial elements in economic growth.

[8] Following, Asongu, & Odhiambo, (2020a) we measure gender inclusion with female labour force participation (FLFP) and female employment (FEMP).

inclusion of these variables in the present study. Table 2 reports the summary statistics of all the variables, while Table 3 reports the correlation matrices.

3.2. Descriptive Statistics and Correlation Matrix of the Variables

The descriptive statistics for the variables are presented in Table 2. We find the value of economic complexity as -0.9227 and the maximum value as 0.3980. This low mean value suggests limited economic diversification, potential vulnerabilities to commodity dependence, and challenges in innovation and technology adoption, which are prevalent in Africa, thereby resulting in a low complexity rate for the region. Similarly, the role of gender inclusion in enhancing economic complexity in Africa is low; this is evident by the low mean value of female labor force participation (0.0067) and female employment (3.9323). This further suggests gender inequalities, potential economic and social constraints on women's employment opportunities, and the importance of implementing policies to address barriers and promote women's inclusion in the workforce. The governance institutional indicators consistently revealed negative mean values, reflecting the subpar state of institutions across the continent. For the evaluation of the relationship among the variables, the correlation matrix is presented in Table 3, unveiling a significant degree of correlation among the diverse facets of governance institutions. Consequently, in order to address the issue of collinearity, we conducted separate regressions for the institutional quality variables, following the approach employed in recent literature (e.g., Ogbonna et al., 2022; Ekeocha et al., 2021). In general, all the variables of the model display a considerable degree of variation, signifying substantial diversity or dispersion among the variables. Additionally, the study ensured the robustness of these findings by examining the variance inflation factor (VIF), which helps in improving the reliability, precision, and interpretability of regression models. The VIF analysis demonstrates that multicollinearity is not a prevalent issue in the models.

3.3 Model specification

It is relevant to recall that the objective of this study is to explore the impact of gender economic inclusion on the economic complexity of Africa, while also investigating how governance institutions moderate the relationship between gender inclusion-economic complexity on the continent. However, in order to estimate equation (1) using the pooled ordinary least squares (OLS) technique, we express it in the functional form as:

$$ECI = f(GINC, TOP, FDI, TOR, INSTQ, INSTQ * GINC) \quad (1)$$

From equation 1 above, GINC denotes gender inclusion which is proxied by female employment (FEMP) and female labor force participation (FLFP), other control variables remain as highlighted in section 3.1.

$$ECI_{i,t} = \alpha_i + \phi_1 FEMP + \phi_2 TOP_{i,t} + \phi_3 FDI_{i,t} + \phi_4 TOR_{i,t} + \phi_5 HCAP_{i,t} + \phi_6 INSTQ_{i,t} + \phi_7 INSTQ * FEMP_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$ECI_{i,t} = \alpha_i + \delta_1 FLFP + \delta_2 TOP_{i,t} + \delta_3 FDI_{i,t} + \delta_4 TOR_{i,t} + \delta_5 HCAP_{i,t} + \delta_6 INSTQ_{i,t} + \delta_7 INSTQ * FLFP_{i,t} + \varepsilon_{i,t}$$

From the above equations, $\varepsilon_{i,t}$ is the error term; In estimating the model in Equation (2), we included the six components of governance institutions in separate estimations thereby avoiding the problem of collinearity. However, considering the potential challenges of unobservable heterogeneity and measurement errors that often affect the pooled ordinary least squares (OLS) methodology (Kamguia et al., 2023), we opted for the system (GMM) approach. This method effectively addresses endogeneity concerns in equation (2) and (3) that may arise from reverse causality. Furthermore, by employing the GMM technique, we correct for unobserved country-specific heterogeneity, a prevalent characteristic across African economies. Therefore, our model adheres to a two-step GMM approach, which includes the incorporation of forward orthogonal deviation controls to mitigate the effects of heteroscedasticity.

Hence, we construct the dynamic model in accordance with Ogbonna et al. (2022), Ogbuabor et al. (2023) and Ogbuabor, Emeka and Nwosu (2023) as follows:

$$ECI_{i,t} = \alpha_i + \phi ECI_{i,t-1} + \phi_1 FEMP_{i,t} + +\phi_2 TOP_{i,t} + \phi_3 FDI_{i,t} + \phi_4 TOR_{i,t} + \phi_5 HCAP_{i,t} + \phi_6 INSTQ_{i,t} + \phi_7 INSTQ * FEMP_{i,t} + \pi_{i,t} \quad (4)$$

$$ECI_{i,t} = \alpha_i + \psi ECI_{i,t-1} + \delta_1 FLFP_{i,t} + +\delta_2 TOP_{i,t} + \delta_3 FDI_{i,t} + \delta_4 TOR_{i,t} + \delta_5 HCAP_{i,t} + \delta_6 INSTQ_{i,t} + \delta_7 INSTQ * FLFP_{i,t} + \pi_{i,t} \quad (5)$$

Where: $\pi_{i,t} = \mu_i + \varepsilon_{i,t}$, where μ_i is the country specific effect and the error term, $\varepsilon_{i,t} \sim iidN(0, \sigma_\varepsilon^2)$, shows no serial correlation, $E[\varepsilon'_{i,t}, \varepsilon_{i,s}] = 0$. Since the countries are cross-sectional, hence $i = 1, 2, \ldots, 34$, the time period, $t = 1, 2, \ldots, 34$. In estimating the model in Equation (3) and (4), we separate the six components of governance institutions in different models to avoid the problem of collinearity. Hence, employing the system GMM approach offers various advantages for addressing endogeneity issues across all explanatory variables by utilizing internal instruments. The estimates were subjected to the Hansen test for over-identifying restrictions and the Arellano-Bond second-order (AR2) test for serial correlation, as recommended by Arellano and Bond (1991) and Hansen (1982).

The adopted GMM approach is the Roodman extension of the difference GMM approach. Consistent with the extant literature (Saba et al., 2024), the choice of corresponding technique is motivated by the persistent nature of the outcome variable, especially as it pertains to the correlation between the level and first lag series of the outcome variable being higher than 0.800 before the empirical analysis (Tchamyou, 2019). This is confirmed in post-estimation diagnostics if the estimated lagged outcome variable is higher than 0.800 but less than 0.999 (Tchamyou, 2020).

3.3 Identification and exclusion restrictions

Studies by Tchamyou and Asongu (2017) and Ogbuabor, Emeka, and Nwosu (2023) have underscored the critical importance of considering identification, simultaneity, and exclusion restrictions within the system GMM framework. Identification involves the careful selection of dependent variables, endogenous explanatory variables, and strictly exogenous variables (Tchamyou et al., 2019). In accordance with Asongu and Odhiambo (2020a), all explanatory

variables in equations (2) to (5) were designated as predetermined endogenous variables, while only the time-invariant indicators were utilized as strictly exogenous variables. This approach to identification aligns with the assertion of Roodman (2009) that time-invariant variables are less likely to be endogenous after the first difference. Incorporating exclusion restrictions as part of the identification process recognizes that time-invariant variables may influence complexity through their presumed impact on endogenous variables. The statistical validity of these exclusion restrictions is assessed using the Difference in Hansen Test (DHT), which evaluates instrument exogeneity. Following the guidance of Asongu, Le Roux, and Biekpe (2017), the validity of the exclusion restriction hypothesis is confirmed when the null hypothesis of the Difference in Hansen Test (DHT) is not rejected. In this study, validation of exclusion restrictions is conducted in Tables 6 and 7, with significance levels set at the conventional 10%, 5%, and 1%.

4. Empirical Results

4.1 Presentation of results

Table 4 and 5 present results from pooled OLS analysis, while Table 6 and 7 present results from system GMM analysis. In Table 4 and Table 6, we utilized female labor force participation (FLFP) as an indicator of gender inclusion, while in Table 5 and Table 7, female employment (FEMP) was employed as a measure of gender inclusion. Notably, all the tables comprise seven panels each[9]. As indicated in Tables 5–7, there exists a predominantly positive and significant relationship between gender inclusion and economic complexity in Africa. This finding aligns with the results of Asongu and Odhiambo (2020b), Barza et al. (2020), and Shuangshuang et al. (2023), who have highlighted the importance of enhancing gender inclusion for sustainable development. Hence, this finding implies that policies promoting gender inclusion can lead to diversification, human capital development, market expansion, reduced gender gaps, enhanced innovation, and increased global competitiveness. Hence, governments and policymakers in the region should promote gender-neutral education, skill development, equal employment opportunities, access to finance, and support for female entrepreneurs, while also encouraging women in leadership roles and challenging gender stereotypes. However, Table 4, which shows the OLS results obtained when female labor force participation is used as a measure of gender inclusion, reveals a negative relationship between economic complexity and female labor force participation. This observation distinctly mirrors the limited engagement of women in economic and productive endeavors, as expounded upon in the introductory section of this study.

Based on the results in Tables 4 –7, the following findings are evident: First, a consistent and significant positive influence of trade openness on Africa's economic complexity is evident; this finding is supported by studies such as Udeagha and Ngepah (2021) and Ekeocha et al. (2023). This underscores the importance of prioritizing strategies to diversify trade and enhance domestic manufacturing, including the removal of tariff and non-tariff trade barriers. Secondly, aligning with studies such as Ogbuabor et al. (2023) and Ogbuabor, Emeka, and Nwosu (2023), foreign direct investment substantially contributes to economic complexity. This finding necessitates the simplification of investment processes, favorable legal frameworks, infrastructure development,

[9] This stems from our utilization of six governance institution indicators and a principal component representing governance institutions as explanatory variables in the analysis.

and incentives for foreign investors. Similarly, international tourism is identified as a significant positive factor influencing economic complexity in Africa, suggesting the need for increased investment in tourism infrastructure, cultural and natural heritage preservation, and sustainable practices.

Interestingly, the results in Table 6 and Table 7 revealed a positive relationship between human capital and economic complexity in Africa. This finding supports economic theories like endogenous growth and neoclassical growth models and empirical studies by Ogbuabor et al. (2019, 2020), emphasizing the significance of human capital in fostering economic growth. The result shows that developing human capital positively affects complexity capacity, indicating that investing in education and skills can lead to a more innovative and efficient workforce. The GMM results in Table 6 and Table 7 show a notable negative relationship between human capital development and economic complexity in Africa, signifying a predominantly adverse and significant impact. This finding contradicts the new growth theory, which emphasizes the role of human capital growth (knowledge and skill accumulation) in economic advancement. However, these results are in line with the prevailing low levels of human capital development in Africa, echoing similar findings by Yalta and Yalta (2021), who noted that a higher number of education years did not yield a substantial improvement in economic complexity within the Middle East and North Africa (MENA) region. These findings correspond with the harsh realities faced by many African economies, marked by poverty, unemployment, and gender discrimination. We, however, conclude that human capital is negatively affecting economic complexity in Africa since the GMM results are a robust estimation of the pooled OLS.

Our study examines the role of governance institutions in driving economic complexity in Africa. Table 4 and Table 5 consistently show a positive relationship between governance institutions and economic complexity in Africa. This finding aligns with Khan et al. (2019) and Vu (2022), which suggested a positive impact of institutional quality on economic activities. Furthermore, this finding implies that quality governance institutions can lead to economic growth, diversification, increased foreign investment, innovation, poverty reduction, international competitiveness, and overall improvements in the well-being of a nation's population. Contrarily, Tables 6 to 7, which are robustness checks to the OLS results of Table 4 and Table 5, predominantly revealed a negative relationship between governance institutions and economic complexity in Africa. In essence, the findings in Table 4 do not support the idea that governance institutions promote economic complexity in Africa, likely due to the generally low governance quality in the region, as evidenced by the negative mean values in Table 3. Notably, our results across all tables reveal a predominantly positive and significant relationship when governance institutional quality interacts with gender inclusion. To address this, we examined the net impact of leveraging governance institutions to shape gender economic inclusion, with the aim of augmenting the complexity of African economies. Following Asongu and Odhiambo (2021), the net impact can be ascertained and considered meaningful solely when the coefficients required to calculate the net effect exhibit significance signs[10]. For instance, consider Panel 1 of Table 4 which is the panel for government effectiveness (GE) as measure of governance institution. The net effect of governance effective is given as = 0.090 = -0.7573 * -0.3898 + (- 0.2044). In this calculation the average value of mean

[10] Following Asongu and Odhiambo (2021) and Iheonu and Ichokwu, (2022), the net effect is thus calculated as the mean of the policy variable multiplied by the coefficient of the interactive term plus the unconditional effect.

of government effectiveness is -0.7573, the marginal impact is -0.3898 and the unconditional effect of female employment is -0.2044.

In light of the above, the interactive impact reveals a positive net effect, which suggests that the overall influence of governance institutions on the relationship between gender inclusion and economic complexity is positive. This finding implies that when governance institutions are supportive of gender equality, regions or countries tend to experience more significant economic complexity and development, highlighting the importance of policies that promote gender economic inclusion and equitable institutions for sustainable economic growth. This finding aligns with similar observations by Anthony-Orji et al. (2019), and Ogbuabor et al. (2020). The implication of this finding is that combining good governance with gender-inclusive policies can have a notable positive impact on economic complexity and overall development. This finding underscores the importance of addressing both institutional quality and gender-related issues in policy-making and development strategies.

Furthermore, following Asongu and Odhiambo (2021), we did not calculate thresholds for governance institutions in Tables 6 and 7 because threshold levels can only be calculated when the unconditional and interactive (i.e., conditional) effects have different signs. Furthermore, since both the unconditional and marginal effects of gender inclusion in Table 6 and Table 7 share the same positive direction, it signifies the existence of a positive synergistic effect, making the computation of a governance threshold level not feasible.

Regarding diagnostic examinations, the Arellano-Bond tests for second-order serial correlation AR (2) presented in Table 6 and Table 7 affirm that all the models do not exhibit any issue related to serial correlation. Furthermore, the over-identifying restriction tests conducted by Hansen (1982) suggest that, in most instances, the hypothesis of jointly valid instruments cannot be rejected in all cases, implying that the set of instruments employed in the estimations satisfied the exogeneity condition required for obtaining valid regression estimates. Thus, there are valid over-identifying restrictions in all cases. In addition, the exclusion restrictions are validated in all the models based on the Difference in Hansen Test at the conventional significance levels highlighted prior (i.e., 10%, 5%, and 1%).

It is important to clarify that in the most robust model, governance enhances the positive role of gender economic inclusion in economic complexity. Hence, the intuition for the testable hypothesis discussed in Section 2 is consistent with the most robust results, not least because in interactive regressions, the estimated coefficients involved in the interactions are not interpreted in isolation (Tchamyou, 2019). Accordingly, the perspective that governance does not drive economic complexity is exclusively relevant to Table 4 based on the OLS, in light of the corresponding negative synergies. However, positive synergies are apparent from the GMM results, and the GMM results are more robust than OLS findings because the former are tailored to account for persistence in the outcome variable and further controls for two dimensions of endogeneity (i.e., simultaneity with the use of internal instruments and the unobserved heterogeneity in terms of country-fixed effects). Hence, the most robust findings are consistent with a strand of extant literature, especially as it pertains to governance levels that have significantly increased over the past decades and the governance driving economic development in Africa (Fosu, 2017; Beyene, 2022).

5. Concluding Remarks and Policy Recommendations

This study investigates how gender inclusion affects economic complexity and how governance institutions are moderating the gender inclusion-complexity relationship in 34 African countries for the period 2010–2021. The empirical evidence is based on the pooled OLS and the system GMM estimation technique. Two gender inclusion measurements are employed: female labor force participation and female employment. The following main findings are established: The findings demonstrate that the unconditional impacts of gender inclusion on economic complexity in Africa are largely positive and statistically significant. Furthermore, although governance institutions primarily exhibit unconditional adverse and statistically significant effects on economic complexity in Africa, they play a positive moderating role in the relationship between gender economic inclusion and economic complexity. From the most robust model (i.e., GMM), positive synergies are apparent because gender economic inclusion promotes economic complexity, and governance dynamics further enhance the positive effect of gender economic inclusion on economic complexity.

The results have several policy implications. First, the evidence of a negative relationship between governance institutional and economic complexity in Africa underscores the necessity for policymakers and leaders on the continent to prioritize wide-ranging institutional reforms that bolster transparency, accountability, and efficiency. These reforms should target the enhancement of the governance framework, curbing corruption, and reinforcing the rule of law. Furthermore, a concerted effort should be made to ensure that these institutions actively support entrepreneurship, innovation, and investment. Additionally, international collaborations and partnerships can play a pivotal role in aiding African nations to fortify their institutional capacity, thereby promoting economic complexity, and ultimately fostering sustainable economic growth and development. Secondly, to harness the positive relationships between trade, foreign direct investment (FDI), and international tourism with economic complexity, policymakers should prioritize measures such as trade facilitation, attractive FDI environments, tourism industry development, diversification of industries, investments in human capital and infrastructure, regulatory simplification, and international collaboration. Finally, to address the negative relationship between human capital and economic complexity, policymakers should focus on aligning education and skills training with economic needs, fostering lifelong learning, promoting innovation and entrepreneurship, diversifying the economy, and incentivizing high-value-added industries while closely monitoring the impact of these measures.

The findings in this study obviously leave room for improvement, especially as it pertains considering how the underlying interactions affect other macroeconomic outcomes that are directly related to the United Nations' Sustainable Development Goals (SDGs) agenda. Moreover, reconsidering the analyses within the remit of country-specific emphases is worthwhile for country-specific policy implications.

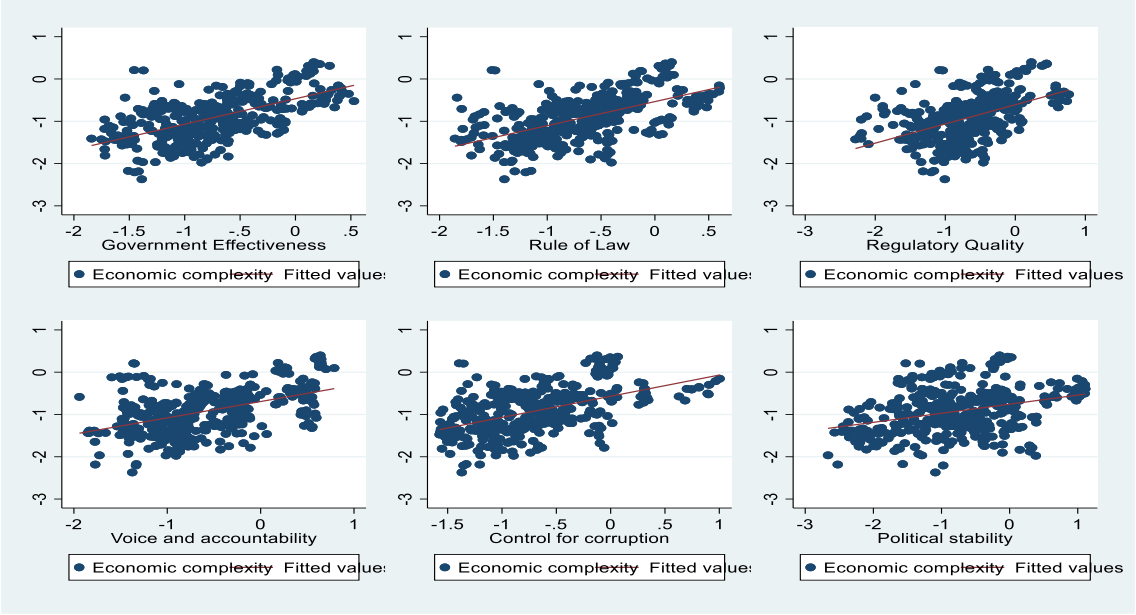
Appendices

Table 1: 2023 Ranking of countries in the atlas of economic complexity index (ECI)

Top 15 Countries in the 2023 ECI Ranking				Ranking of Top 15 African Countries			
S/No.	**Country**	**2023 ECI**	**Ranking**	**S/No.**	**Country**	**2023 ECI**	**Ranking**
1	Japan	2.26	1	1	Tunisia	0.39	45
2	Switzerland	2.14	2	2	Eswatini	-0.00	63
3	South Korea	2.04	3	3	Egypt	-0.13	67
4	Germany	1.94	4	4	South Africa	-0.15	68
5	Singapore	1.83	5	5	Mauritius	-0.17	71
6	Czechia	1.75	6	6	Kenya	-0.35	80
7	Austria	1.68	7	7	Morocco	-0.35	81
8	United Kingdom	1.61	8	8	Malawi	-0.51	89
9	Slovenia	1.59	9	9	Uganda	-0.53	92
10	Sweden	1.54	10	10	Namibia	-0.58	95
11	Hungary	1.52	11	11	Algeria	-0.63	96
12	Slovakia	1.46	12	12	Senegal	-0.66	97
13	Ireland	1.44	13	13	Mali	-0.73	99
14	United States of America	1.40	14	14	Burkina Faso	-0.75	100
15	Finland	1.36	15	15	Madagascar	-0.77	102

Source: Authors, with data from the Massachusetts Institute of Technology's Observatory of Economic Complexity (http://atlas.media.mit.edu).

Figure 1: Economic complexity and various governance indicators



Source: Authors

Table 2: Descriptive Statistics of the variables

Variables	Observations	Mean	Std. Dev.	Minimum	Maximum
Economic complexity (ECI)	408	-0.9227	0.5158	-2.3705	0.3980
Female Labor Force Participation (FLFP)	408	0.0067	0.9757	-2.3963	1.5661
Female Employment (FE)	408	3.9323	0.4018	2.7107	4.4475
Trade (TOP)	408	4.0931	0.4295	1.4176	4.8734
Foreign direct investment (FDI)	408	0.2403	1.6111	-8.5838	2.6109
International tourism (TOR)	408	1.3714	1.6365	-6.9525	3.8402
Human Capital	408	0.5518	0.1046	0.3381	0.7481
Government Effectiveness (GE)	408	-0.7573	0.5129	-1.8408	0.5280
Regulatory Quality (RQ)	408	-0.6917	0.5480	-2.2822	0.7648
Rule of Law (RL)	408	-0.6830	0.5238	-1.8567	0.6014

Control for Corruption (CC)	408	-0.7074	0.5321	-1.5746	1.0033
Voice and accountability (VC)	408	-0.5931	0.6244	-1.9404	0.7884
Political Stability (PS)	408	-0.7749	0.7983	-2.6652	1.1110
Principal Component Analysis (PCA)	408	0.0000	2.2061	-4.9351	5.9040

Source: Authors' computations.

Table 3: Correlation matrix

	ECI	FLPFP	FEM	TOP	FDI	TOR	HDI	GE	RQ	RL	CC	VC	PS	PCA
ECI	1.0000													
FLPFP	0.1475	1.0000												
FEM	-0.1700	-0.1460	1.0000											
TOP	0.0276	0.0244	0.0389	1.0000										
FDI	0.2570	-0.2250	-0.1444	-0.1830	1.0000									
TOR	0.5611	0.0205	0.0963	-0.3308	0.3210	1.0000								
HDI	0.4115	0.4827	-0.5382	0.1605	-0.2092	0.0238	1.0000							
GE	0.6249	0.2325	-0.1971	0.2104	-0.0418	0.3649	0.5526	1.0000						
RQ	0.5167	0.2382	0.0541	0.2232	-0.0076	0.3891	0.2921	0.8399	1.0000					
RL	0.6048	0.2293	-0.1235	0.1417	0.0171	0.4748	0.4505	0.9064	0.8792	1.0000				
CC	0.5327	0.0991	-0.1294	0.2873	0.0140	0.3170	0.3865	0.8671	0.8136	0.8905	1.0000			
VC	0.4763	0.2167	0.1820	0.2856	0.0579	0.2556	0.1720	0.7092	0.8135	0.7649	0.7705	1.0000		
PS	0.3153	0.3283	0.1083	0.5292	-0.2686	0.1549	0.3692	0.5703	0.6023	0.6220	0.6188	0.6014	1.0000	
PCA	0.5796	0.2458	-0.0274	0.3024	-0.0344	0.3714	0.4163	0.9211	0.9285	0.9519	0.9323	0.8716	0.7352	1.0000

Source: Authors

Table 4: Pooled OLS Estimation Result for Female Labor Force Participation (FLFP). Dependent variable = Economic complexity

Regressors	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 7
Female Labor Force Participation (FLFP)	-0.2044** (0.034)	-0.1546 (0.671)	-0.3304*** (0.000)	-0.4745*** (0.000)	-0.3723*** (0.000)	-0.2107*** (0.047)	-0.0322 (0.549)
Government Effectiveness (GE)	1.9101*** (0.000)						
Government Effectiveness (GE)* Female Labor Force Participation (FLFP)	-0.3898*** (0.002)						
Regulatory Quality (RQ)		1.0074** (0.016)					
Regulatory Quality (RQ)* Female Labor Force Participation (FLFP)		-0.1980** (0.058)					
Rule of Law (RL)			2.5757*** (0.000)				
Rule of Law (RL)* Female Labor Force Participation (FLFP)			-0.5687*** (0.000)				
Control for corruption (CC)				3.3693*** (0.000)			
Control for corruption (CC) * Female Labor Force Participation (FLFP)				-0.7698*** (0.000)			
Voice and Accountability (VC)					1.6491*** (0.000)		
Voice and Accountability (VC)* Female Labor Force Participation (FLFP)					-0.3572*** (0.000)		
Political Stability (PS)						1.0283*** (0.000)	
Political stability (PS)* Female Labor Force Participation (FLFP)						-0.2446*** (0.006)	

Institutional Quality (PCA)							0.7039*** (0.000)
Institutional Quality (PCA) * Female Labor Force Participation (FLFP)							-0.1567*** (0.000)
Trade (TOP)	0.0203 (0.690)	0.0819** (0.017)	0.1135** (0.016)	0.0452 (0.396)	0.0288 (0.595)	0.1084** (0.042)	0.0581** (0.014)
Foreign direct investment (FDI)	0.0599*** (0.000)	0.0618*** (0.000)	0.0722*** (0.000)	0.0502*** (0.000)	0.0476*** (0.000)	0.0620*** (0.000)	0.0510*** (0.000)
International tourism (TOR)	0.1171*** (0.000)	0.1310*** (0.000)	0.1241*** (0.000)	0.1240*** (0.000)	0.1449*** (0.000)	0.1621*** (0.000)	0.1144*** (0.000)
Human capital **(**HDI)	1.1568*** (0.000)	1.7937*** (0.000)	1.4044*** (0.000)	1.4444*** (0.000)	1.6840*** (0.000)	2.0034*** (0.000)	1.3512*** (0.000)
Constant	-1.1557*** (0.002)	-1.6895*** (0.000)	-2.4852 (0.410)	0.3468 (0.562)	-0.5689 (0.262)	-0.2446*** (0.000)	-1.4985*** (0.000)
VIF	1.69	2.86	1.83	2.86	2.26	1.33	2.56
F-statistics	76.24*** (0.000)	66.14*** (0.000)	101.70*** (0.000)	91.07*** (0.000)	98.22*** (0.000)	61.11*** (0.000)	85.47*** (0.000)
R^2	0.6005	0.5660	0.5879	0.6011	0.6066	0.5464	0.6048
No. of countries	34	34	34	34	34	34	34
Net effect of FLPF	0.090	N/A	0.058	0.070	-0.161	-0.021	N/A
Threshold of Governance	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Authors computation. **Note:** *denotes significance at 10% level, **denotes significance at 5% level, and ***denotes significance at 1% level. N/A= not available. The mean value of government effectiveness is -0.7573. The mean value of regulatory quality is -0.6917. The mean value of rule of law is -0.6830. The mean value of control of corruption is -0.7074. The mean value of voice & accountability is -0.5931. The mean of political stability is -0.7749. The mean value of institutional quality is 0.000.

Table 5: Pooled OLS Estimation Result for Female Employment (FEMP). Dependent variable = Economic complexity

Regressors	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 7
Female employment (FEMP)	0.1574***	0.1128***	0.0832**	0.1369***	-0.0172	0.0215	-0.0244
	(0.001)	(0.009)	(0.043)	(0.002)	(0.597)	(0.502)	(0.238)
Government Effectiveness (GE)	0.2790***						
	(0.000)						
Government Effectiveness (GE)* Female employment (FEMP)	0.2156***						
	(0.000)						
Regulatory Quality (RQ)		0.2236***					
		(0.000)					
Regulatory Quality (RQ)* Female employment (FEMP)		0.1982***					
		(0.000)					
Rule of Law (RL)			0.2147***				
			(0.000)				
Rule of Law (RL)* Female employment (FEMP)			0.2147***				
			(0.001)				
Control for corruption (CC)				0.1796***			
				(0.000)			
Control for corruption (CC)* Female employment (FEMP)				0.2149***			
				(0.000)			
Voice and Accountability (VC)					0.2148***		
					(0.000)		
Voice and Accountability (VC)* Female employment (FEMP)					0.0476		
					(0.115)		
Political Stability (PS)						0.0561*	
						(0.080)	
Political stability (PS)* Female employment (FEMP)						0.0491*	
						(0.052)	
Institutional Quality (PCA)							0.0592***
							(0.000)
Institutional Quality (PCA) *Female employment (FEMP)							0.0405***
							(0.001)

Trade (TOP)	0.0492	0.0574	0.0877**	0.0362	0.0590	0.1203**	0.0223
	(0.291)	(0.230)	(0.049)	(0.475)	(0.232)	(0.023)	(0.660)
Foreign direct investment (FDI)	0.0545***	0.0617***	0.0520***	0.0469***	0.0557***	0.0716***	0.0594***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
International tourism (TOR)	0.1311***	0.1262***	0.1322***	0.1486***	0.1389***	0.1552***	0.1264***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Human capital **(**HDI)	1.0031***	1.6784***	1.4537***	1.4135***	2.0402***	2.0887***	1.5201***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-1.7027***	-2.1556***	-2.1601***	-1.9638***	-2.3845***	-2.7720***	-2.0765***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
VIF	2.84	2.18	2.32	2.34	1.64	2.14	1.56
F-statistics	73.98***	70.44***	76.82***	77.55***	68.57***	58.96***	72.42***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.6102	0.5932	0.5793	0.5895	0.5943	0.5412	0.5952
No. of countries	34	34	34	34	34	34	34
No. of observations	363	363	363	363	363	363	363

Source: Authors computation. **Note:** *denotes significance at 10% level, **denotes significance at 5% level, and ***denotes significance at 1% level. N/A= not available.

Table 6: System GMM Estimation result for Female Labor Force Participation (FLFP). Dependent variable = Economic complexity

Regressors	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 7
One lag period of complexity	0.9675***	0.9537***	0.9379***	0.9222***	0.8939***	0.8948***	0.9388***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female Labor Force Participation (FLFP)	0.1076*	0.1831**	0.2489****	0.4745***	0.3142**	0.4468***	0.0381
	(0.056)	(0.046)	(0.003)	(0.000)	(0.027)	(0.003)	(0.645)
Government Effectiveness (GE)	-0.3698***						
	(0.001)						
Government Effectiveness (GE)* Female Labor Force Participation (FLFP)	0.0057***						
	(0.005)						
Regulatory Quality (RQ)		-0.4891**					
		(0.030)					
Regulatory Quality (RQ)* Female Labor Force Participation (FLFP)		0.0087**					
		(0.028)					
Rule of Law (RL)			-0.7928***				
			(0.000)				
Rule of Law (RL)* Female Labor Force Participation (FLFP)			0.0119***				
			(0.002)				
Control for corruption (CC)				-0.4989*			
				(0.083)			
Control for corruption (CC) * Female Labor Force Participation (FLFP)				0.0046*			
				(0.083)			
Voice and Accountability (VC)					-0.0649		
					(0.706)		
Voice and Accountability (VC)* Female Labor Force Participation (FLFP)					0.0019*		
					(0.056)		
Political Stability (PS)						-0.4889***	
						(0.006)	

Political stability (PS)* Female Labor Force Participation (FLFP)						0.0109*** (0.001)	
Institutional Quality (PCA)							-0.1888*** (0.001)
Institutional Quality (PCA) * Female Labor Force Participation (FLFP)							0.0028*** (0.002)
Trade (TOP)	0.1240*** (0.000)	0.0998*** (0.000)	0.1627*** (0.000)	0.2692*** (0.000)	0.1402*** (0.000)	0.0313 (0.494)	0.2120*** (0.000)
Foreign direct investment (FDI)	0.2646* (0.050)	0.0272** (0.037)	0.0441*** (0.007)	0.0856*** (0.000)	0.0730*** (0.001)	0.0797*** (0.007)	0.0515*** (0.006)
International tourism (TOR)	0.0072* (0.050)	0.0116* (0.098)	0.0235*** (0.003)	0.0122* (0.067)	0.0057 (0.547)	0.0168 (0.207)	0.0157* (0.064)
Human capital **(**HDI)	0.2154 (0.600)	-0.0070 (0.984)	0.5485 (0.173)	1.8576*** (0.000)	1.7494*** (0.005)	0.3976 (0.401)	0.8427** (0.030)
Constant	-1.1227** (0.045)	-1.2000** (0.036)	-2.1246*** (0.002)	-4.2674*** (0.000)	-2.9940*** (0.002)	-2.1217** (0.014)	-1.5649** (0.030)
Time effects	yes	yes	yes	yes	Yes	yes	Yes
No. of countries	34	34	34	34	34	34	34
Diagnostic checks							
AR(1)	0.003	0.002	0.002	0.002	0.002	0.001	0.002
AR(2)	0.172	0.129	0.125	0.120	0.125	0.127	0.135
Sargan	0.002	0.001	0.003	0.012	0.002	0.031	0.007
Hansen	0.212	0.152	0.260	0.505	0.183	0.125	0.184
No. of Instruments	20	20	20	20	20	20	20
No. of groups	31	31	31	31	31	31	31
F-statistics	237.595 (0.000)	4138.32 (0.000)	1230.29 (0.000)	1415.14 (0.000)	674.50 (0.000)	155.411 (0.000)	125.411 (0.000)
DHT for instruments							
(a)Instruments in levels							
H excluding group	0.167	0.142	0.212	0.461	0.147	0.197	0.147
Dif(null, H=exogenous)	0.994	0.356	0.793	0.549	0.733	0.736	0.765

(b) IV (years, eq(diff))							
H excluding group	0.787	0.496	0.546	0.396	0.790	0.511	0.574
Dif(null, H=exogenous)	0.124	0.116	0.202	0.504	0.104	0.191	0.131

Source: Authors computation. **Note:** *denotes significance at 10% level, **denotes significance at 5% level, and ***denotes significance at 1% level. N/A= not available.

Table 7: System GMM Estimation result for Female Employment (FEMP). Dependent variable = Economic complexity

Regressors	**Panel 1**	**Panel 2**	**Panel 3**	**Panel 4**	**Panel 5**	**Panel 6**	**Panel 7**
One lag period of complexity	0.8628***	0.7936***	0.8710***	0.8864***	0.8123***	0.8969***	0.8423***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female employment (FEMP)	0.1828***	0.1419***	0.1176***	0.1245***	0.1270***	0.1422***	0.1201***
	(0.001)	(0.008)	(0.006)	(0.006)	(0.000)	(0.008)	(0.001)
Government Effectiveness (GE)	-0.3053**						
	(0.028)						
Government Effectiveness (GE)*	0.1390**						
Female employment (FEMP)	(0.015)						
Regulatory Quality (RQ)		-0.0904					
		(0.588)					
Regulatory Quality (RQ)*		0.0897**					
Female employment (FEMP)		(0.021)					
Rule of Law (RL)			-0.1643				
			(0.453)				
Rule of Law (RL)* Female			0.0827**				
employment (FEMP)			(0.046)				
Control for corruption (CC)				-0.2151**			
				(0.022)			
Control for corruption (CC)*				0.1130***			
Female employment (FEMP)				(0.001)			
Voice and Accountability (VC)					-0.0614		
					(0.348)		

Voice and Accountability (VC)* Female employment (FEMP)					0.0547** (0.040)		
Political Stability (PS)						-0.0454 (0.404)	
Political stability (PS)* Female employment (FEMP)						0.0211* (0.086)	
Institutional Quality (PCA)							-0.0337 (0.195)
Institutional Quality (PCA) *Female employment (FEMP)							0.0199** (0.060)
Trade (TOP)	0.1126*** (0.000)	0.0931*** (0.001)	0.1012*** (0.000)	0.0754** (0.021)	0.0826*** (0.000)	0.1011*** (0.004)	0.0865*** (0.006)
Foreign direct investment (FDI)	0.0384*** (0.001)	0.0470*** (0.001)	0.0305** (0.046)	0.0201** (0.055)	0.0428*** (0.000)	0.0359** (0.026)	0.0440*** (0.000)
International tourism (TOR)	0.0359** (0.017)	0.0197 (0.273)	0.0222 (0.323)	0.0253** (0.031)	0.0212*** (0.015)	0.0131** (0.035)	0.0232** (0.047)
Human capital **(**HDI)	0.0465 (0.818)	0.1040 (0.651)	-0.0544 (0.834)	-0.0398 (0.804)	-0.0345 (0.830)	-0.2045 (0.120)	-0.1716 (0.389)
Constant	-0.7662*** (0.005)	-0.6601** (0.010)	-0.5792** (0.032)	-0.4661** (0.042)	-0.5307*** (0.001)	-0.4434** (0.014)	-0.4597** (0.025)
Time effects	yes	yes	yes	yes	Yes	Yes	Yes
No. of countries	34	34	34	34	34	34	34
Diagnostic checks							
AR(1)	0.005	0.003	0.004	0.005	0.004	0.003	0.004
AR(2)	0.148	0.139	0.157	0.151	0.131	0.141	0.140
Sargan	0.004	0.012	0.005	0.007	0.004	0.003	0.004
Hansen	0.310	0.275	0.294	0.347	0.251	0.348	0.354
No. of Instruments	20	20	20	20	20	20	20
No. of groups	31	31	31	31	31	31	31
F-statistics	833.98 (0.000)	849.41 (0.000)	117.562 (0.000)	781.71 (0.000)	141.008 (0.000)	302.044 (0.000)	211.044 (0.000)
DHT for instruments							
(a)Instruments in levels							

H excluding group	0.291	0.372	0.308	0.303	0.246	0.318	0.321
Dif(null, H=exogenous)	0.390	0.094	0.244	0.588	0.314	0.459	0.480
(b) IV (years, eq(diff))							
H excluding group	0.582	0.591	0.517	0.678	0.564	0.521	0.573
Dif(null, H=exogenous)	0.240	0.206	0.240	0.251	0.190	0.291	0.282

Source: Authors computation. **Note:** *denotes significance at 10% level, **denotes significance at 5% level, and ***denotes significance at 1% level. N/A= not available.

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